

## **REMARKS**

This paper is submitted in reply to the Office Action dated September 4, 2008, within the three-month period for response. Reconsideration and allowance of all pending claims are respectfully requested.

In the subject Office Action, claims 40-43 were rejected under 35 U.S.C. § 101. Additionally, claims 1-10, 14-22, 26-30, 32-38, and 40-43 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 7,409,517 to Dageville et al. Claims 11-13, 23-25, 31 and 39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Dageville

Applicant respectfully traverses the Examiner's rejections to the extent that they are maintained. Applicant has canceled claims 41 and 43, amended claims 1, 26, 40 and 42, and added new claims 44-45. Applicant respectfully submits that no new matter is being added by the above amendments, as the amendments are fully supported in the specification, drawings and claims as originally filed. Applicant also notes that the amendments made herein are being made only for facilitating expeditious prosecution of the aforementioned claimed subject matter. Applicant is not conceding in this application that the originally claimed subject matter is not patentable over the art cited by the Examiner, and Applicant respectfully reserves the right to pursue this and other subject matter in one or more continuation and/or divisional patent applications.

Now turning to the subject Office Action and specifically with regard to the § 101 rejections, the Examiner will note that Applicant has canceled claims 41 and 43 and amended claims 40 and 42 to clarify that the computer readable signal bearing medium is "recordable type." As discussed in paragraph [0031] of the published application, a recordable type media is defined to include only physical and tangible media. Furthermore, Applicant specifically distinguishes a recordable type medium from "transmission type" media such as digital and analog communication links, the types of media more commonly associated with signals. Withdrawal of the § 101 rejections is therefore respectfully requested.

Next turning to the art-based rejections, and specifically to the Examiner's rejection of independent claim 1, this claim generally recites a method of dynamically adjusting database performance in a computer system. The method includes receiving a request for a temporary allocation of a system resource for a database query to be executed in the future; and dynamically and temporarily adjusting resource allocation in the computer system in response to receiving the request such that the database query is executed under the adjusted resource allocation.

Therefore, claim 1 is generally directed to a method whereby resource allocation is temporarily adjusted in a computer responsive to requests that are made prior to the execution of database queries so that those database queries, when executed, are done so using the requested resource allocation. By doing so, a computer may be optimized to run specific queries using desirable resource allocations, thereby providing an ability for a query optimizer, which is generating the access or execution plans for queries, to appropriately match those queries with optimal execution environments.

Of note, the requests that drive the adjustments to resource allocation are specific to particular queries, i.e., the requests are used to enable a system to be appropriately configured for optimal execution of the particular queries for which the requests are made. In addition, claim 1 has been amended to clarify that the recited request is "based upon a desired resource allocation determined in association with generating an access plan for the database query." Support for this amendment may be found, for example, in Fig. 3, block 66 and paragraph [0044] of the application as filed.

In rejecting claim 1, the Examiner relies on Dageville, and in particular, the abstract, col. 2, lines 15-25, col. 3, lines 22-33, col. 4, lines 30-45, and col. 5, lines 20-28. Dageville, however, operates on a fundamentally different principle, and does not operate responsive to a query-specific request to temporarily adjust resource allocation based upon a desired resource allocation determined in association with the generation of an access plan for a query, as is required by claim 1.

In particular, Dageville discloses a system in which an externally-set global value is determined for a database application, representing a target or maximum amount of

memory that will be allocated for the application (col. 3, lines 3-11). From this value, a global internal value is calculated, representing a total amount of memory available for allocating to database queries (col. 3, lines 12-20). Then, from the internal value, operator-specific memory bounds are computed for different database operators, representing the amount of memory that a process will allocate for a work area for a particular type of operator (e.g., a join operator, a sort operator, etc.) when executing a query (col. 3, lines 22-42). The system also includes a feedback loop to periodically adjust the internal value and/or the operator-specific memory bounds based upon the actual memory usage (col. 3, lines 43-52).

Dageville also discloses the concept of operator profiles, which store, for a particular operator, the estimated memory needed to run the operator in one of three modes. In an optimal mode, the operator operates without disk access. In a one pass mode, the operator uses disk access, but only one pass is required. In a minimal mode, multiple passes are used (col. 4, lines 46-64). When the memory bound for a particular operator is greater than the memory required to run in optimal mode, the operator runs in that mode. If the memory bound is less than that required to run in optimal mode, but more than that required to run in one pass mode, the operator runs in the one pass mode, and if the memory bound is less than required to run in one pass mode, the minimal mode is used (col. 4, line 64 to col. 5, line 20).

Thus, for example, whenever a process is ready to execute a query in Dageville, the process will presumably allocate memory for each of the operators required by the query, using the current memory bound value for each operator to determine how much memory to allocate. In addition, the operators are run in different modes based upon whether the current memory bound value is sufficient for particular modes of operation. The memory bound values, however, are only changed either periodically, or if the total allocated memory exceeds the maximum allowed (col. 3, lines 52-64).

Therefore, Dageville discloses an adaptive system that is based on the overall state of the system, rather than on particular requests for particular database queries, as is the focus of claim 1. The amounts of memory that certain operators will be allocated in

Dageville changes over time based upon the load of the system, and to the extent that the amount of memory allocated to individual queries varies, it is based upon adjustments made to the operator-specific memory bound values.

Claim 1, on the other hand, is request-driven, i.e., the allocation of resources is driven by requests for the temporary allocation of system resources that are specific to particular database queries to be executed in the future. In addition, the requests are based upon a desired resource allocation determined in association with generating an access plan for the database query. Specifically, as is discussed in the published application, e.g., at paragraphs [0015] and [0042]-[0056] and shown in Fig. 3, embodiments consistent with the invention recited in claim 1 operate by determining a desired resource allocation in connection with generating the access plan that will be used to execute the database query, and then generating a request to a resource manager such that when that access plan is executed for the query, the resource allocation in the system will be set to the desired resource allocation to enable the database query to be optimally executed.

The specific passages relied upon by the Examiner do not disclose the request-driven resource allocation methodology recited in claim 1. The abstract discloses that a global value is defined for an application, and that internal values are calculated from the global value (and periodically updated) for use when allocating memory. However, there is no disclosure of any query-specific request that drives the allocation of memory, nor any request that is based upon a determination, made in association with generating an access plan for a database query, of a desired resource allocation for that query.

Likewise, the passages on cols. 2 and 3 disclose essentially the same concept disclosed in the abstract of Dageville. The passage at col. 5, on the other hand, merely discloses the factors used to take into account how much memory should be allocated for each operator (which is not query-specific, since the operators are apparently used for all queries).

The passage at col. 4 is the only passage that even discloses query-specific operations, however, these operations fail anticipate the relevant features recited in claim 1. Col. 4, lines 30-34 discloses that each query process can derive the amount of memory to

be allocated to each operator used by that query from the global internal value. However, there is no disclosure in the passage of any query-specific request to temporarily adjust resource allocation. Furthermore, there is no disclosure that a request, or even an amount of resources to allocate, is based upon a desired resource allocation determined in association with generating an access plan for a database query. In fact, Dageville does not even disclose the generation of an access or execution plan, whether in the passage or otherwise, so Applicant submits that Dageville cannot be interpreted as disclosing the determination of a desired resource allocation in association with generating an access or execution plan.

Col. 4, lines 35-45 discloses the concept of allocating different amounts of memory for an operator based upon the priority of a query. While arguably the amount of memory allocated for each query is query specific, Applicant submits that the priority-based methodology described in Dageville does not anticipate claim 1. First, the priority assigned to a query is not properly considered to be any type of “request for a temporary allocation of a system resource for a database query to be executed in the future,” as is required by claim 1. While the amount of system resources allocated may vary depending upon priority, Applicant submits that the use of a priority does not constitute a “request” within the context of claim 1. Second, claim 1 requires that the request be “based upon a desired resource allocation determined in association with generating an access plan for the database query.” A priority assigned to a database query does not involve any calculation of a desired resource allocation, and given that the generation of an access plan is not even discussed in Dageville, Applicant submits that the reference does not disclose any such calculation performed within this context.

Applicant therefore respectfully submits that claim 1 is novel over Dageville, and that the rejection thereof should be withdrawn. Applicant also submits that claim 1 is non-obvious over Dageville, given that Dageville uses a system-wide approach, and thus does not suggest any type of on-demand, query specific resource allocation methodology, much less one in which determinations are made as to desired resource allocations in connection with generating access plans. Claim 1 is therefore patentable over Dageville.

Reconsideration and allowance of claim 1, and of claims 2-14 which depend therefrom, are therefore respectfully requested.

Next, with respect to independent claim 15, this claim recites a method of performing a database query on a computer system, which includes generating an access plan for the database query, including determining an adjustment to a resource allocation in the computer system that optimizes execution of the access plan; dynamically and temporarily applying the adjustment to the resource allocation in the computer system; and executing the access plan while the adjustment to the resource allocation in the computer system is applied.

In rejecting claim 15, the Examiner cites the same passages in Dageville as were applied to claim 1; however, the Examiner did not separately apply Dageville to the specific language of claim 15. Claim 15, however, recites “generating an access plan for the database query, including determining an adjustment to a resource allocation in the computer system that optimizes execution of the access plan,” a feature that Dageville fails to disclose. As discussed above in connection with claim 1, Dageville does not even explicitly disclose generating access plans whatsoever. Furthermore, Applicant can find no disclosure, whether in the specific passages cited by the Examiner or otherwise, of any determination of an adjustment to a resource allocation specifically for the purpose of optimizing the execution of an access plan for a database query, much less a determination that is made as part of generating the access plan for the query.

Applicant respectfully submits that Dageville does not disclose, among other features, “generating an access plan for the database query, including determining an adjustment to a resource allocation in the computer system that optimizes execution of the access plan.” Claim 15 is therefore novel over the reference, and the rejection should be withdrawn. In addition, as Dageville fails to suggest any type of on-demand, query specific resource allocation methodology, much less one in which determinations are made as to adjustments to resource allocations in connection with generating access plans, Applicant submits that claim 15 is also non-obvious over the reference. Reconsideration

and allowance of claim 15, and of claims 16-25 which depend therefrom, are therefore respectfully requested.

Next, with respect to independent claims 26, 33, 40 and 42, claims 26 and 40 have been amended in a similar manner to claim 1, while claims 33 and 42 are commensurate in scope with claim 15. Claims 26, 33, 40 and 42 are therefore novel and non-obvious over Dageville for the same reasons as discussed above. Reconsideration and allowance of claims 26, 33, 40 and 42, and of claims 27-32 and 34-39 which depend therefrom, are therefore respectfully requested.

Next, with respect to the dependent claims, Applicant traverses the Examiner's rejections of the dependent claims based upon their dependency on the aforementioned independent claims. Nonetheless, Applicant does note that a number of these claims recite additional features that further distinguish these claims from the references cited by the Examiner.

For example, claims 7-9, 22, 30 and 38 recite in part the concept of a request specifying a duration, such that a readjustment to resource allocation is performed after the specified duration. In rejecting these claims, the Examiner relies on col. 6, lines 53-65 of Dageville. This passage, however, only discloses periodically revising internal target values, or alternatively revising the values whenever a process determines excessive memory has been allocated. There is no disclosure of any duration that is specified in a request, much less a request having the characteristics recited in the respective independent claims. Claims 7-9, 22, 30 and 38 are therefore patentable over Dageville for this additional reason.

Claim 10 recites in part readjusting a memory pool upon completion of execution of a database query. The Examiner cites cols. 3 and 4 of Dageville, however, neither passage discloses the readjustment of resource allocation upon completion of execution of a query. The only time memory allocation is readjusted in Dageville is either (1) periodically or (2) when it is determined that the total amount of available memory has been exceeded. The fact that a query has ended plays no part in triggering the readjustment

of resource allocation in Dageville. Claim 10 is therefore patentable over Dageville for this additional reason.

Claims 14, 17-18, 32 and 34-35 recite in part generating a request using a query optimizer in connection with generating a query access plan. As noted above, Dageville does not even disclose generating an access plan, much less a query optimizer, so the reference falls short as an anticipatory reference as to claims 14, 17-18, 32 and 34-35.

As a final matter, Applicant has added new claims 44-45, each of which ultimately depends from claim 15. Claim 44 recites that generating the access plan for the database query further includes generating a plurality of potential access plans; for each potential access plan, calculating a desired resource allocation, an estimated cost using the desired resource allocation, and an estimated cost using a current resource allocation; selecting a first minimum cost access plan from among the plurality of potential access plans based upon the estimated costs using the desired resource allocations; and selecting a second minimum cost access plan from among the plurality of potential access plans based upon the estimated costs using the current resource allocations. Claim 45 depends from claim 44 and additionally recites that generating the access plan for the database query further includes calculating a cost difference between the first and second minimum cost access plans; and selecting the first minimum cost access plan for execution in response to the cost difference exceeding a threshold. Support for these claims may be found, for example, in Fig. 3, and the accompanying text at paragraphs [0042]-[0056] of the published Application. Applicant submits that Dageville, which does not even disclose the generation of a query access plan, similarly does not disclose the specific steps recited in claims 44 and 45. Consideration and allowance of these claims are therefore respectfully requested.

In summary, Applicant respectfully submits that all pending claims are novel and non-obvious over the prior art of record. Reconsideration and allowance of all pending claims are therefore respectfully requested. If the Examiner has any questions regarding the foregoing, or which might otherwise further this case onto allowance, the Examiner may contact the undersigned at (513) 241-2324. Moreover, if any other charges or credits



are necessary to complete this communication, please apply them to Deposit Account 23-3000.

Respectfully submitted,

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Date

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